Installation Instructions

Kinetix 300 Single-axis Servo Drives

Catalog Numbers 2097-V31PR0, 2097-V31PR2, 2097-V32PR0, 2097-V32PR2, 2097-V32PR4, 2097-V33PR1, 2097-V33PR3, 2097-V33PR5, 2097-V33PR6, 2097-V34PR3, 2097-V34PR5, 2097-V34PR6

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About the Kinetix 300 Drives

Kinetix 300 single-axis servo drives provide an Ethernet enabled solution for applications with output power requirements in the range of 0.4…3.0 kW (2…12 A rms).

Refer to the Kinetix 300 Single-axis Servo Drive User Manual, publication 2097-UM001, for detailed information on wiring, applying power, troubleshooting, and integration with ControlLogix, CompactLogix, or MicroLogix controller platforms.

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Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.literature.rockwellautomation.com) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard and recognize the consequences.
SHOCK HAZARD	Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
BURN HAZARD	Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

Catalog Number Explanation

This publication applies to the following Kinetix 300 drives.

Kinetix 300 Drive Catalog Numbers

Cat. No.	Single-axis Servo Drive (120/240V)
2097-V31PR0	Kinetix 300,120/240V AC, 1 Ø, 2.0 A
2097-V31PR2	Kinetix 300, 120/240V AC, 1 Ø, 4.0 A
	Single-axis Servo Drive (240V)
2097-V32PR0	Kinetix 300, 240V AC,1 Ø, 2.0 A, with integrated filter
2097-V32PR2	Kinetix 300, 240V AC, 1 Ø, 4.0 A, with integrated filter
2097-V32PR4	Kinetix 300, 240V AC, 1 Ø, 8.0 A, with integrated filter
2097-V33PR1	Kinetix 300, 240V AC, 1 Ø or 3 Ø, 2.0 A
2097-V33PR3	Kinetix 300, 240V AC, 1 Ø or 3 Ø, 4.0 A
2097-V33PR5	Kinetix 300, 240V AC, 1 Ø or 3 Ø, 8.0 A
2097-V33PR6	Kinetix 300, 240V AC, 1 Ø or 3 Ø, 12.0A
	Single-axis Servo Drive (480V)
2097-V34PR3	Kinetix 300, 480V AC, 3 Ø, 2.0 A
2097-V34PR5	Kinetix 300, 480V AC, 3 Ø, 4.0 A
2097-V34PR6	Kinetix 300, 480V AC, 3 Ø, 6.0 A

Before You Begin

Remove all packing material, wedges, and braces from within and around the components. After unpacking, check the item nameplate catalog number against the purchase order.

Parts List

The Kinetix 300 drive ships with:

- general purpose power input (IPD) header, back-up power (BP) header, shunt resistor and DC bus (BC) header, motor power (MP) header, and safe torque off (STO) header.
- a ground clamp that also provides strain relief for motor power cable.
- these installation instructions, publication 2097-IN001.

TIP

Connector kit for motor feedback (catalog number 2090-K2CK-D15M) is not provided.

Replacement connector sets (catalog number 2097-CONN1), as described in the Parts List, are also available.

Refer to the Kinetix Motion Control Selection Guide, publication GMC-SG001, for more information on connector kits and replacement connector sets.

Install the Kinetix 300 Drive

These procedures assume you have prepared your panel, and understand how to bond your system. For installation instructions regarding equipment and accessories not included here, refer to the instructions that came with those products.

SHOCK HAZARD

To avoid hazard of electrical shock, perform all mounting and wiring of the Kinetix 300 drive prior to applying power. Once power is applied, connector terminals may have voltage present even when not in use.

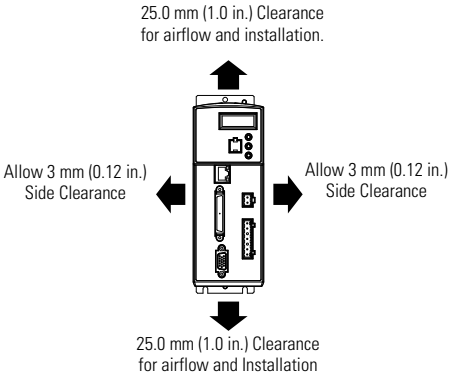
ATTENTION

Plan the installation of your system so that you can perform all cutting, drilling, tapping, and welding with the system removed from the enclosure. Because the system is of the open type construction, be careful to keep any metal debris from falling into it. Metal debris or other foreign matter can become lodged in the circuitry, which can result in damage to components.

Mount the Kinetix 300 Drive

Follow these steps to mount the drive.

1. Observe these clearance requirements when mounting the drive to the panel.


25.0 mm (1.0 in.) Clearance
for airflow and installation.
Allow 3 mm (0.12 in.)
Side Clearance
Allow 3 mm (0.12 in.)
Side Clearance
25.0 mm (1.0 in.) Clearance
for airflow and Installation

Allow additional space for side mount or rear mount AC line filters. See the table and Kinetix 300 AC Line Filter Installation Instructions, publication 2097-IN003.

Drive	Cabinet Depth, min mm (in.)
2097-V31PR0	332 (13)
2097-V31PR2	
2097-V32PR0	377 (15)
2097-V32PR2	
2097-V32PR4	
2097-V33PR1	332 (13) (1)
2097-V33PR3	
2097-V33PR5	
2097-V33PR6	377 (15)
2097-V34PR3	332 (13) (1)
2097-V34PR5	
2097-V34PR6	377 (15)

(1) If using an AC line filter, add 50 mm (2 in.)

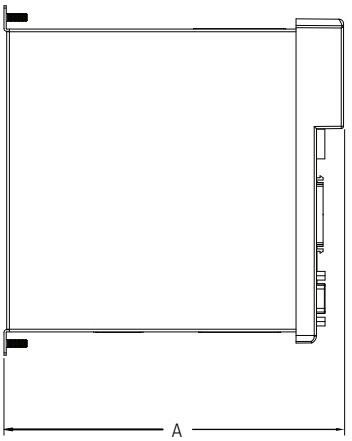
IMPORTANT Mount the module in an upright position as shown. Do not mount the module on its side.

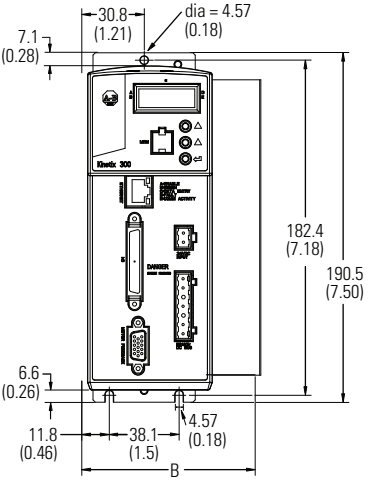
2. Mount the Kinetix 300 drive to the cabinet sub-panel with a M4 (#6-32) steel machine screw torqued to 1.1 N•m (9.8 lb•in).

   For catalog numbers 2097-V33PR1, 2097-V33PR3, 2097-V33PR5, 2097-V34PR3, and 2097-V34PR5 that will be using a AC line filter, refer to the AC Line Filter Installation Instructions, publication 2097-IN003, for sub-panel mounting hole pattern.

Kinetix 300 Drive Mounting Dimensions

Dimensions are in mm (in.).





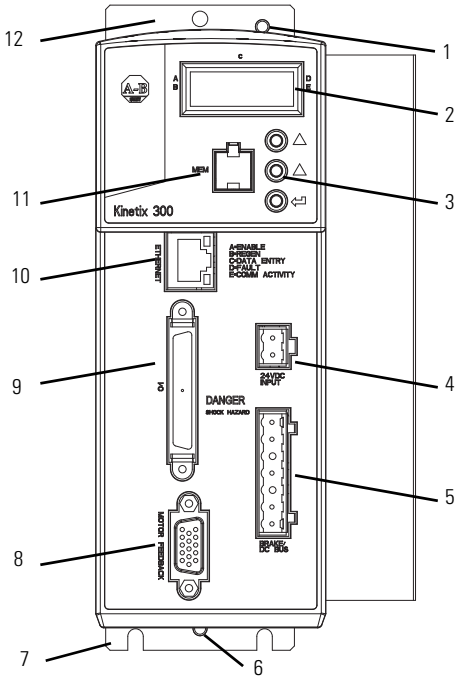
Cat. No.	A mm (in.)	B mm (in.)
2097-V31PR0	185.1 (7.29)	68.0 (2.68)
2097-V31PR2	185.1 (7.29)	68.5 (2.70)
2097-V32PR0	229.6 (9.04)	68.0 (2.68)
2097-V32PR2	229.6 (9.04)	68.5 (2.70)
2097-V32PR4	229.6 (9.04)	86.8 (3.42)
2097-V33PR1	185.1 (7.29)	68.0 (2.68)

Cat. No.	A mm (in.)	B mm (in.)
2097-V33PR3	185.1 (7.29)	68.5 (2.70)
2097-V33PR5	185.1 (7.29)	94.4 (3.72)
2097-V33PR6	229.6 (9.04)	68.0 (2.68)
2097-V34PR3	185.1 (7.29)	68.5 (2.70)
2097-V34PR5	185.1 (7.29)	94.4 (3.72)
2097-V34PR6	229.6 (9.04)	68.0 (2.68)

Connector Data

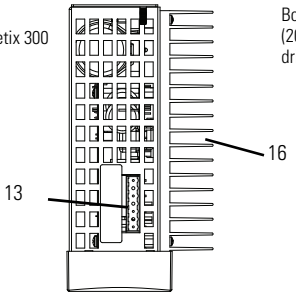
Use this illustration to identify the Kinetix 300 drive features and indicators.

Kinetix 300 Drive Features and Indicators

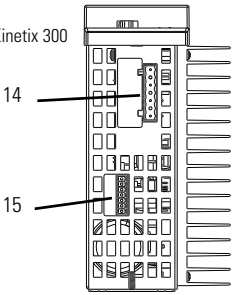


Item	Description
1	Ground lug
2	Status and diagnostic display
3	Display control push buttons (3)
4	Back-up power (BP) connector
5	Shunt resistor and DC bus (BC) connector
6	Ground lug
7	Bottom mounting flange
8	Motor feedback (MF) connector
9	I/O (IOD) connector
10	Ethernet communication port (Port 1)
11	Memory module
12	Top mounting flange
13	Mains (IPD) connector
14	Motor power (MP) connector
15	Safe torque off (STO) connector
16	Heat sink (on some models)

Top View
(2097-V33PR5 Kinetix 300 drive is shown)



Bottom View
(2097-V33PR5 Kinetix 300 drive is shown)



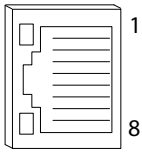
Kinetix 300 Drive Connectors

Designator	Description	Connector
IPD	AC mains input power	4-position plug/header
PORT1	Ethernet communication port	RJ45 Ethernet (2)
IOD	I/O	SCSI 50 pin high density connector
MF	Motor feedback	15-pin high-density D-shell (male)
BP	Back-up power	2-pin quick-connect terminal block
BC	Brake resistor and DC bus	5-pin quick-connect terminal block
MP	Motor power	6-pin quick-connect terminal block
STO	Safe torque off (STO) terminal	6-pin quick-connect terminal block

Mains (IPD) Connector

IPD Pin	Description	Signal
1	Protective earth (ground)	PE
2	AC power in	L1
3	AC power in	L2
4	AC power in (3 phase models)	L3

Pin Orientation for 8-pin Ethernet Communication Port (port 1)



Ethernet Communication Port (port 1)

Port 1 Pin	Description	Signal
1	Transmit port (+) data terminal	+ TX
2	Transmit port (-) data terminal	- TX
3	Receive port (+) data terminal	+ RX
4	—	—
5	—	—
6	Receive port (-) data terminal	- RX
7	—	—
8	—	—

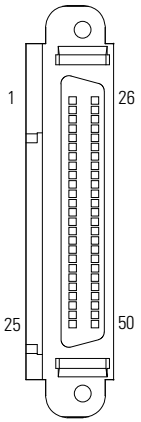
I/O (IOD) Connector Pinout

IOD Pin	Description	Signal
1	Master encoder A+/Step+ input	MA+
2	Master encoder A-/Step- input	MA-
3	Master encoder B+/Direction+ input	MB+
4	Master encoder B-/Direction- input	MB-
5	Drive logic common	GND
6	+5V DC Output (max 100 mA)	5V DC
7	Buffered encoder output: channel A+	BA+
8	Buffered encoder output: channel A-	BA-
9	Buffered encoder output: channel B+	BB+
10	Buffered encoder output: channel B-	BB-
11	Buffered encoder output: channel Z+	BZ+
12	Buffered encoder output: channel Z-	BZ-
13…21	Reserved	—
22	Analog common	ACOM
23	Analog output (max 10 mA)	AO
24	Positive (+) of analog signal input	AIN1+
25	Negative (-) of analog signal input	AIN1-
26	Digital input group ACOM terminal	IN_A_COM
27	Digital input A1	IN_A1
28	Digital input A2	IN_A2
29	Digital input A3	IN_A3
30	Digital input A4	IN_A4
31	Digital input group BCOM terminal	IN_B_COM
32	Digital input B1	IN_B1
33	Digital input B2	IN_B2
34	Digital input B3	IN_B3
35	Digital input B4	IN_B4
36	Digital input Group CCOM Terminal	IN_C_COM
37	Digital input C1	IN_C1
38	Digital input C2	IN_C2
39	Digital input C3	IN_C3

I/O (IOD) Connector Pinout (continued)

IOD Pin	Description	Signal
40	Digital input C4	IN_C4
41	Ready output collector	RDY+
42	Ready output emitter	RDY-
43	Programmable output #1 collector	OUT1-C
44	Programmable output #1 emitter	OUT1-E
45	Programmable output #2 collector	OUT2-C
46	Programmable output #2 emitter	OUT2-E
47	Programmable output #3 collector	OUT3-C
48	Programmable output #3 emitter	OUT3-E
49	Programmable output #4 collector	OUT4-C
50	Programmable output #4 emitter	OUT4-E

Pin Orientation for 50-pin SCSI I/O (IOD) Connector



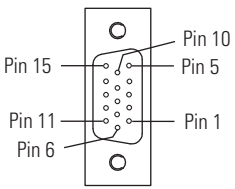
Motor Feedback (MF) Connector Pinout

MF Pin	Description	Signal
1	Sine differential input+ AM+ Differential input+	MTR_SIN+ MTR_AM+
2	Sine differential input- AM- Differential input-	MTR_SIN- MTR_AM-
3	Cosine differential input+ BM+ Differential input+	MTR_COS+ MTR_BM+
4	Cosine differential input- BM- Differential input-	MTR_COS- MTR_BM-
5	Data differential input + Index pulse+	MTR_DATA+ MTR_IM+
6	Common	MTR_ECOM
7	Encoder power (+9V)	MTR_EPWR_9V (1)
8	Single-ended 5V Hall effect commutation	MTR_S3
9	Reserved	—
10	Data differential input - Index pulse-	MTR_DATA- MTR_IM-
11	Motor thermal switch (normally closed) (2)	MTR_TS
12	Single-ended 5V Hall effect commutation	MTR_S1
13	Single-ended 5V Hall effect commutation	MTR_S2
14	Encoder power (+5V)	MTR_EPWR_5V (1)
15	Reserved	—

(1) Encoder power supply uses either 5V or 9V DC based on encoder/motor used.

(2) Not applicable unless motor has integrated thermal protection.

Pin Orientation for 15-pin Motor Feedback (MF) Connector



Control Power Back-up (BP) Pinout

BP Pin	Description	Signal
1	Positive 24V DC	+24V DC
2	24V DC power supply return	Return

Shunt Resistor and DC Bus (BC) Pinout

BC Pin	Description	Signal
1…2	Positive DC bus/brake resistor	B+
3	Brake resistor	BR
4…5	Negative DC bus	B-

Motor Power (MP) Pinout

MP Pin	Description	Signal
1	Motor power out	U
2	Motor power out	V
3	Motor power out	W
4	Protective earth (ground)	PE

Safe Torque Off (STO) Pinout

STO Pin	Description	Signal
1	+24V DC output from the drive	+24V DC control
2	+24V DC output common	Control COM
3	Safety status	Safety Status
4	Safety input 1 (+24V DC to enable)	Safety Input 1
5	Safety common	Safety COM
6	Safety input 2 (+24V DC to enable)	Safety Input 2

The Kinetix 300 drive ships with the safe torque off enabled. Connect the safe torque off inputs to a safety circuit or install motion allowed jumpers to obtain motion. Refer to the Kinetix 300 Single-axis Servo Drive User Manual, publication 2097-UM001, for details.

Power Wiring Requirements

Wire should be copper with 75 °C (167 °F) minimum rating. Phasing of main AC power is arbitrary and earth ground connection is required for safe and proper operation.

IMPORTANT The National Electrical Code and local electrical codes take precedence over the values and methods provided.

Kinetix 300 Drive Power Wiring Requirements

Cat. No.	Description	Terminals		Recommended Wire Size mm² (AWG)	Strip Length mm (in.)	Torque Value N•m (lb•in)
		Pin	Signal			
2097-V31PR0 2097-V32PR0 2097-V32PR2 2097-V33PR1 2097-V33PR3 2097-V34PR3 2097-V34PR5 2097-V34PR6	Mains input power	IPD-1 IPD-2 IPD-3 IPD-4	L3 L2 L1 PE	2.5 (14)	7 (0.28)	0.5 (4.5)
2097-V32PR4 2097-V33PR5				4.0 (12)	7 (0.28)	0.5 (4.5)
2097-V31PR2 2097-V33PR6				6.0 (10)	7 (0.28)	0.56…0.79 (5.0…7.0)
2097-V31PR0 2097-V32PR0 2097-V32PR2 2097-V32PR4 2097-V33PR1 2097-V33PR3 2097-V33PR5 2097-V34PR3 2097-V34PR5 2097-V34PR6 2097-V31PR2	Motor power	MP-1 MP-2 MP-3 MP-4	PE W V U	2.5 (14)	7 (0.28)	0.5 (4.5)
2097-V33PR6				4.0 (12)	7 (0.28)	0.5 (4.5)

Kinetix 300 Drive Power Wiring Requirements

Cat. No.	Description	Terminals		Recommended Wire Size mm^2 (AWG)	Strip Length mm (in.)	Torque Value N•m (lb•in)
		Pin	Signal			
2097-V31PR0 2097-V32PR0 2097-V32PR2 2097-V32PR4 2097-V33PR1 2097-V33PR3 2097-V33PR5 2097-V34PR3 2097-V34PR5 2097-V34PR6 2097-V31PR2	Brake resistor and DC bus(1)	BC-1 BC-2 BC-3 BC-4 BC-5	B+ B+ BR B- B-	2.5 (14)	7 (0.28)	0.5 (4.5)
2097-V33PR6				4.0 (12)	7 (0.28)	0.5 (4.5)
2097-V3*x*PR*x*	Control back-up power	BP-1 BP-2	+24V DC Return	1.5 (16)	6 (0.25)	0.5 (4.5)
2097-V3*x*PR*x*	Safe torque off	STO-1 (2) STO-2 (2) STO-3 STO-4 STO-5 STO-6	+24V DC Control Control COM Safety Status Safety Input 1 Safety COM Safety Input 2			

(1) Use for shunt resistor connection only.

(2) Use for bypassing the STO circuit only.

ATTENTION

To avoid personal injury and/or equipment damage, make sure installation complies with specifications regarding wire types, conductor sizes, branch circuit protection, and disconnect devices. The National Electrical Code (NEC) and local codes outline provisions for safely installing electrical equipment.

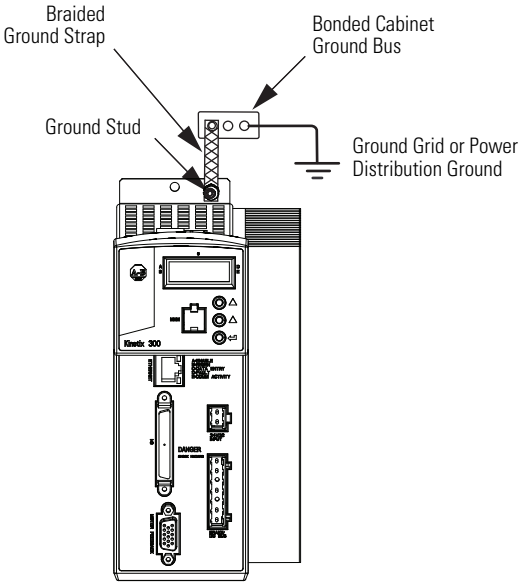
To avoid personal injury and/or equipment damage, make sure motor power connectors are used for connection purposes only. Do not use them to turn the unit on and off.

To avoid personal injury and/or equipment damage, make sure shielded power cables are grounded to prevent potentially high voltages on the shield.

Ground Your Kinetix 300 Drive to the Subpanel

If the Kinetix 300 drive is mounted on a painted subpanel, ground to a bonded cabinet ground bus using a braided ground strap or 4.0 mm^2 (12 AWG) solid copper wire 100 mm (3.9 in.) long.

Connecting the Braided Ground Strap Example



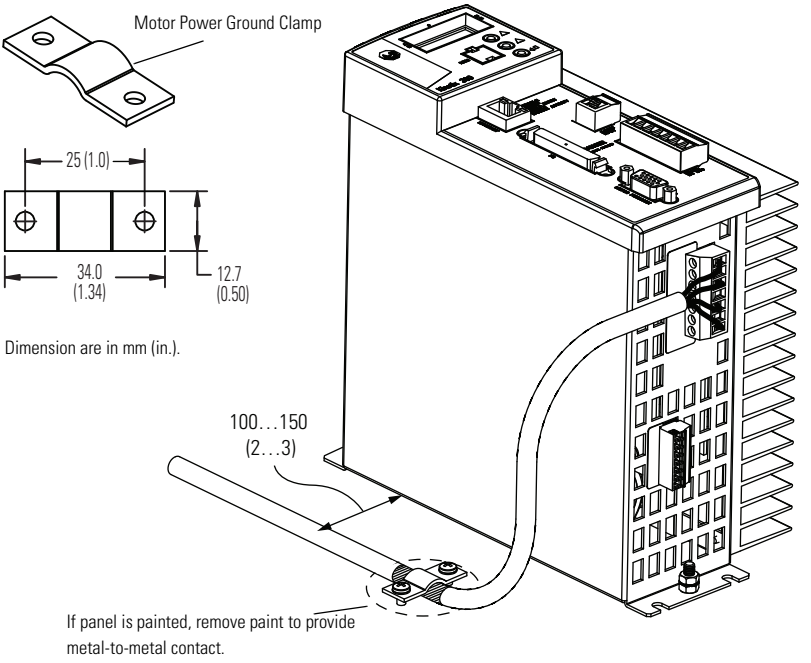
For dimensions, Kinetix 300 Drive Mounting Dimensions on page 6.

Kinetix 300 Drive Motor Power Wire Shielding

A motor power ground clamp and 2 #6-32 x 1 screws are supplied with the Kinetix 300 drive.

Install the supplied motor power ground clamp within 100…150 mm (2…3 in.) of the drive using the 2 #6-32 x 1 screws.

Motor Power Ground Clamp Installation



Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
Kinetix 300 Single-axis Servo Drive User Manual, publication 2097-UM001	Information on installing, configuring, starting up, troubleshooting, and specifications for your Kinetix 300 servo drive system.
Kinetix 300 Shunt Resistor Installation Instructions, publication 2097-IN002	Information on installing and wiring Kinetix 300 shunt resistors.
Kinetix 300 AC Line Filter Installation Instructions, publication 2097-IN003	Information on installing and wiring the Kinetix 300 AC line filter.
Kinetix 300 I/O Terminal Expansion Block Installation Instructions, publication 2097-IN005	Information on installing and wiring the Kinetix 300 I/O terminal expansion block.
Kinetix 300 Memory Module Installation Instructions, publication 2097-IN007	Information on installing the Kinetix 300 memory module.
Kinetix 300 Memory Module Programmer Quick Start, publication 2097-QS001	Information on using the memory module programmer to duplicate the memory module.
1769-L32E and 1769-L35E CompactLogix Controller Installation Instructions, publication 1769-IN020	Information on how to assemble and mount the controller, how to upgrade firmware, and controller technical specifications.
1769-L32C and 1769-L35CR CompactLogix Controller Installation Instructions, publication 1769-IN070	Information on how to assemble and mount the controller, how to upgrade firmware, and controller technical specifications.
1769-L31 CompactLogix Controller Installation Instructions, publication 1769-IN069	Information on how to assemble and mount the controller, how to upgrade firmware, and controller technical specifications.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.literature.rockwellautomation.com. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.

Notes:

Notes:

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.support.rockwellautomation.com, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.support.rockwellautomation.com.

Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

United States	1.440.646.3434 Monday – Friday, 8 a.m. – 5 p.m. EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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